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been said and written by supporters of the osmotic pressure and electrolytic dissociation theories on the one hand, and by those of the hydrate theory on the other, should be forgotten. Far from being irreconcilable, the theories are complementary, and workers may, each according to his proclivity, pursue a useful course in following either. One type of mind finds satisfaction in using a handy tool to obtain practical results; another delights only in probing the ultimate nature of the material with which he works. For the progress of science both types are necessary—the man who determines exact atomic weights as well as the man who speculates upon the nature of the atoms. That the want of knowledge as to what the exact nature and mechanism of osmotic pressure is, should prevent accurate experimental work being done on it, or interfere with its use in theoretical reasoning, is equally ridiculous with the proposition that because in the theory of osmotic pressure we have a good quantitative tool for the investigation of solutions, therefore we should abandon altogether the problem of its nature.

The fundamental ideas of a science are the gift to that science of the few great masters; the many journeymen investigators may be trusted to utilize them according to their abilities. Having once given his great principles to the world, van't Hoff remained practically a spectator of their development; but by his single act he provided generations of chemists with useful and profitable fields for their labor.

J. WALKER

THE COAL PRODUCTION OF PENNSYLVANIA

PENNSYLVANIA'S coal production in 1910 was 235,006,762 short tons, valued at \$313,304,812. Of this 84,485,236 short tons was anthracite, valued at \$160,275,302, and 150,521,526 short tons was bituminous coal, valued at \$153,-

029,510. Compared with 1909, when the total production of the state amounted to 219,037,150 short tons, valued at \$279,266,824, the production in 1910 shows an increase of 15,969,612 short tons, or 7 per cent., in quantity, and of \$34,037,988, or 12.2 per cent. in value. Of the total increase 3,314,877 short tons was in the production of anthracite and 12,554,735 short tons in the production of bituminous coal. The value of the anthracite production showed an increase of \$11,093,713, or 7.4 per cent., and that of bituminous coal increased \$22,944,273, or 17.64 per cent. Although the quantity of bituminous coal produced exceeded that of anthracite by nearly 80 per cent., the value of the anthracite product was larger than that of the bituminous output by nearly \$7,250,000. Bituminous coal represented 63.6 per cent. of the total output and anthracite represented 51 per cent. of the total value.

The anthracite mines of Pennsylvania gave employment to 169,497 men, who worked an average of 229 days. The bituminous mines employed 175,403 men for an average of 238 days. The average production for each man employed in the anthracite region was 498 short tons during the year. In the bituminous mines the men averaged 825 tons each. The daily average production for each employee in the anthracite region was 2.17 short tons and in the bituminous districts it was 3.61 tons. According to the Pennsylvania Department of Mines 601 men were killed and 1,050 were injured in the anthracite mines in 1910. The fatal accidents in the bituminous mines numbered 539 and the nonfatal accidents numbered 1,142.

In the combined production of anthracite and bituminous coal Pennsylvania outranks any of the coal-producing countries of the world except Great Britain and Germany, and in 1910 it came within 10,000,000 short tons, or less than 5 per cent., of equalling the output of Germany. Pennsylvania's production in 1910 was more than four times that of Austria-Hungary in 1909, and more than five times that of France in 1910, and nearly 20 per cent. of the total coal production of the

world. From 1829 to and including the first year of the present century Pennsylvania contributed over 50 per cent. of the total coal production of the United States and still produces between 45 and 50 per cent. of the total. The industry, particularly in the bituminous districts, has kept pace with the manufacturing industries and has increased in considerably larger ratio than the population of the state and of the United States as a whole.

Anthracite mining began in Pennsylvania in 1814, when 20 long tons were produced for local consumption. The year 1820 is, however, usually considered to mark the beginning of the anthracite industry, as in that year 365 long tons were shipped from the anthracite region. From 1814 to the close of 1910 the total production of anthracite had amounted to 1,946,717,383 long tons, or 2,180,323,469 short tons.

The first records of bituminous-coal production in Pennsylvania are for the year 1840, when 464,826 short tons were mined. The total output of bituminous coal from 1840 to the close of 1910 has amounted to 2,251,737,097 short tons, from which it appears that the total production of anthracite and of bituminous coal in Pennsylvania has been nearly equal. At the close of 1908 the total production of anthracite from the earliest times to the close of that year had exceeded the total bituminous production by approximately 51,000,000 tons. As, however, the production of bituminous coal in 1909 and 1910 exceeded that of anthracite by more than 122,000,000 short tons, the total production of bituminous coal now exceeds that of anthracite.

THE MEMORIAL TO ANTON DOHRN

At a meeting of the International Zoological Congress held at Graz in August, 1910, a plan was initiated to establish a memorial to the late Professor Dohrn, the founder and director of the Zoological Station at Naples. It may be doubted whether any other single institution has equaled this one in its contributions to the progress of biology in the

past thirty years. To its development Dohrn devoted the whole energy of a singularly forceful and many-sided personality, laboring incessantly to keep the station fully abreast of modern progress, to enlarge its scope and to improve its equipment and methods, until it stood among the foremost of biological laboratories. It long since became a gathering place for investigators from many countries, and the influence that these men carried with them to their own institutions of learning made the Naples Zoological Station a potent force in the progress of biological science throughout the world.

Dohrn's far-reaching influence upon biology was due as much to his rare personal qualities as to his scientific work. He took a keen interest in the work of other investigators, even in fields far removed from his own, and was always ready with encouragement, particularly to younger men. Those who had the good fortune to come under his kindly and stimulating influence will not forget the debt they owe him. Beyond all this, the versatility of his human interests and his genius for friendship made him the center of an ever-widening circle that knew no limits of occupation or of nationality, and he was a force in the life of his time that is not to be measured by technical achievement alone but by a higher standard.

At the Zoological Congress it was proposed to establish a memorial of Dohrn's life and work, to include (1) a bronze portrait relief, to be erected in the laboratory at Naples, and (2) an endowment fund to aid in carrying on the steadily expanding work of the station. It is fortunate for the first of these aims that Dohrn had given sittings shortly before his death to the eminent sculptor Hildebrand, of Munich, who has executed a beautiful work of art that is well worthy of the present purpose. The need of additional funds for the station, as a result of the constant expansion of its work, was a subject of much concern to Dohrn in the latter part of his life. Those who knew him best feel sure that no form of memorial, could he have foreseen it, would have been